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that subscriptions have been received of a sufficient amount to procure a portrait in oil, which will soon be completed and presented to the University. The artist selected is Mr. Robert G. Hardie, of New York.

ENTOMOLOGY.

In a paper read to the K. Böhm. Gesellschaft der Wissenschaften on November 23d last, Dr. Anton Fritsch, of Prag, announced the discovery in the Permian beds of Bohemia of the larval cases of a caddis-fly. This is the first indication of the existence of insects with a complete metamorphosis in paleozoic times, unless the doubtful fragments found by Dathe in Silesian culm are to be regarded as shards of beetles, or the passages found in certain carboniferous woods are to be credited to coleopterous larvae. It is to be hoped that Dr. Fritsch will amply illustrate these remains in his great work now in progress on the Fauna der Gaskohle Böhmens.

GENERAL.

PROFESSOR WARBURG, of Freiberg, has been called to Berlin as the successor of Kundt.

PROFESSOR KULZ, of Marburg, known for his researches in physiological chemistry, died on January 16.

MACMILLAN & Co. announce a translation by Dr. A. C. Porter, of the University of Pennsylvania, of the *Lehrbuch der Botanik*, by Strasburger, Noll, Schenck and Schimper.

THE St. Petersburg Academy of Sciences has recently made some changes in the system of publishing papers communicated to it. In September, 1894, it commenced the publication of a monthly number, under the title *Bulletin de l' Académie Impériale des Sciences*, which serves as the organ of the three classes of the Academy. This *Bulletin* is intended to include the *procès-verbaux* of the meetings, annual reports of scientific researches, reports on prizes conferred by the Academy, notes on the work of the

museums, &c. In addition to notices of this kind, the *Bulletin* will contain short scientific papers. The *Mémoires de l' Académie Impériale des Sciences* will form in future the second means of publication. It will be divided into two independent series, dealing respectively with the physico-mathematical section of the Academy's papers, and the historical and philological section. The publication of the *Mélanges, tirés du Bulletin*, has been discontinued.—*Nature*.

AN International Congress on Childhood will be held in Florence in the spring of 1895. Among the questions to be discussed are the physical, moral and mental elevation of children, children's hospitals, the care of deaf-mute and blind children up to the time of their admission into an educational institution, care of poor and abandoned children, reformatories, and vagabondage in its relation to childhood.—*N. Y. Medical Record*.

SOCIETIES AND ACADEMIES.

A. A. A. S. MEETING, 1895.

At a special meeting of the Council, held on January 26th, it was decided to postpone the proposed meeting in San Francisco. An invitation from Springfield, Mass., to hold the meeting of 1895 in that city, was accepted. The date of the meeting was fixed as follows: Council meeting, Wednesday, August 28th, at noon; General Sessions, Thursday, August 29th, at 10 A. M.

Special efforts will be made by the officers of the sections to prepare programmes for the sections in advance of the meeting and for this purpose members are requested to send abstracts of their papers, as early as possible, to the Permanent Secretary, or to the Secretaries of the Sections.

F. W. PUTNAM, *Permanent Secretary.*
SALEM, MASS., Jan. 30, 1895.

NEW YORK ACADEMY OF SCIENCES; SECTION

OF ASTRONOMY AND PHYSICS, FEB. 4.

PROFESSOR W. HALLOCK showed a new

photographic method of comparing the rate of vibration of two tuning forks. The forks are so clamped that a prong of each is held in front of a manometric capsule. The forks are bowed and the flames photographed as described in the Physical Review, Vol. II., p. 305, 1875. The vibrations are then counted in the wavy line on the negative. The accuracy in ordinary work is about two or three-tenths of a wave per second.

The second paper was by Prof. J. K. Rees on the *Penumbrae of sun-spots* as shown in Rutherford's photographs, with especial reference to the discussion at the December meeting of the Royal Astronomical Society. Professor Rees called the attention of the Section to the remarks made by the Rev. F. Howlett on presenting to the Royal Astronomical Society of London three volumes of sun-spot drawings. This set of volumes contains drawings made during a period of thirty-five years, and shows minute details in regard to the forms and changes of solar spots. The Rev. Mr. Howlett stated that his main object in continuing the series had been to test the theory put forth by Professor Wilson, of Glasgow, in the latter part of the last century. Wilson's theory claimed that the penumbra in a spot shelves down toward the umbra; and that the portion of the penumbra nearest the sun's centre will, therefore, grow narrower and narrower, due to perspective, as the sun-spot reaches a point nearer and nearer to the limb. Mr. Howlett claimed that his drawings showed that the Wilsonian theory was not borne out by his observations as recorded in his drawings.

He made bold to say that, instead of the penumbra of the spot possessing shelving sides sloping down toward the umbra, the penumbra shows a convex surface in a curve conformable to the general contour of the solar surface. He remarked that he had not himself witnessed a single case of certain notching of the limb.

Professor Rees exhibited on the screen a series of fine photographs of the solar surface taken by Mr. Rutherford with his photographic telescope (13 inches diameter of object glass, 11 feet of focal length) during the years 1870-1871. Attention was called to the appearance of the penumbral regions of the spots which showed conclusively that the penumbra was, as a rule, eccentric with respect to the umbra. Spots were pointed out near the centre of the sun where the penumbral marking was deficient on, sometimes the west side, then on the east side, sometimes on the north side and sometimes on the south side. Spots were also indicated which showed, when near the limb of the sun, the penumbral region wanting on the side farthest from the centre and well developed on the side toward the centre. So far as these photographs showed, there was no doubt that the Wilson theory did not completely explain the various phenomena.

Professor Rees also showed some pictures of sun-spots taken by Mr. C. A. Post, of New York City, exhibiting the non-central character of the umbra with respect to the penumbra. Mr. C. A. Post, of New York City, then threw on the screen some photographs of the sun and moon that he had taken.

He also exhibited a series of strikingly beautiful lantern slides made from photographs of lightning flashes.

Professor M. I. Pupin described his *new form of automatic vacuum-pump* (see Am. Journ. Sci., Vol. 39, 1895, p. 19). An extremely ingenious device utilizes an ordinary vacuum pump (water pump) to raise mercury for the Sprengel pump. Little mercury is needed and the whole is continuous in its action.

INDIANA ACADEMY OF SCIENCE.

The Indiana Academy of Science met at Indianapolis, December 27-28, 1894, with W. A. Noyes, of the Rose Polytechnic of

Terre Haute, as President, and C. A. Waldo, of Dé Pauw University, as Secretary.

The Academy was well attended by the leading scientists of the State.

After the ordinary preliminary business, the body continued in general session, and listened to the reading of nine papers on general scientific topics.

The Academy then met in two sections, Physico-Chemical and Biological. In the former section, 28 short papers were read, and in the latter 51. The papers indicated that much work had been done during the past year in the various lines of scientific investigation.

The reports from the directors of the Biological Survey of Indiana were encouraging, showing that every effort was being put forth to accomplish this survey as quickly as possible and in a satisfactory manner. A resolution was passed requesting the Legislature of the State to print and distribute the proceedings of the Academy. This expense has always been borne by the Academy, but in view of the fact that the State is reaping the benefits it should assume the expense.

The Spring meeting will be held at the Wyandotte Cave, in Crawford county.

Following is a list of the papers:
Address by the Retiring President,—Lavoisier.

W. A. NOYES.

GENERAL SUBJECTS.

1. *Some Facts in Distribution of Gleditschia Triacanthos and Other Trees:* Ernest Walker.
2. *Propagation and Protection of Game and Fish:* I. W. Sharp.
3. *Anthropology; the Study of Man:* Amos W. Butler.
4. *A New Biological Station and its Aim:* C. H. Eigenmann.
5. *Transmission of Impressions in Spinal Cord:* G. A. Talbert.
6. *Does High Tension of Electric Current Destroy Life:* J. L. Campbell.

7. *The Surdue Engineering Laboratory since the Restoration:* Wm. F. M. Goss.

8. *Method of Determining Sewage Pollution of Rivers:* Chas. C. Brown.

9. *Psychological Laboratory of Indiana University:* W. L. Bryan.

PHYSICO-CHEMICAL SUBJECTS.

10. *Interesting Deposit of Alumina Oxyhydrate:* G. W. Benton.
11. *Observations on Glacial Drift of Jasper County:* A. H. Purdue.
12. *Concerning a Burial Mound Recently Opened in Randolph County:* Joseph Moore.
13. *Reversal of Current in the Toepler Holtz Electrical Machine:* J. L. Campbell.
14. *A Florida Shell Mound:* U. F. Glick.
15. *Note on Rock Flexure:* E. M. Kindle.
16. *The Alternate-Current Transformer with Condenser in one or both Circuits:* Thomas Gray.
17. *Elastic Fatigue of Wires:* C. Leo Mees.
18. *A Warped Surface of Universal Elliptic Eccentricity:* C. A. Waldo.
19. *Accurate Measurements of Surface Tension:* A. L. Foley.
20. *Effect of the Gaseous Medium on the Electrochemical Equivalent of Metals:* C. Leo Mees.
21. *Some new Laboratory Appliances in Chemistry:* H. A. Huston.
22. *Volumetric Determination of Phosphorus in Steel:* W. A. Noyes and J. S. Royse.
23. *Action of Ammonia upon Dextrose:* W. E. Stone.
24. *Action of Zinc Ethyl on Ferric Chloride and Ferric Bromide:* H. H. Ballard.
25. *The Sugar of the Century Plant:* W. E. Stone and Dumont Lotz.
26. *Camphoric Acid:* W. A. Noyes.
27. *Action of Potassium Sulfhydrate upon Certain Aromatic Chlorides:* Walter Jones and F. C. Scheuch.
28. *A New Phosphate:* H. A. Huston.
29. *Dip of the Keokuk Rocks at Bloomington, Ind:* Edward M. Kindle.

30. *Structural Geologic Work of J. H. Means in Arkansas*: J. C. Branner.

31. *Wave Marks on Cincinnati Limestone*: W. P. Shannon.

32. *Correlation of Silurian Sections in Eastern Indiana*: V. F. Marsters and E. M. Kindle.

33. *Some New Indian Fossils*: C. E. Newlin.

34. *Extinct Fauna of Lake County*: T. H. Ball.

35. *Streptomatidae of the Falls of the Ohio, with their Synonymy*: R. Ellsworth Call.

36. *Streams of Southeastern Indiana, with List*: H. M. Stoops.

37. *The Swamps of Franklin County*: H. M. Stoops.

51. *The Batrachians and Reptiles of Wabash County*: W. O. Wallace.

52. *On the Occurrence of the Whistling Swan (Olor columbianus) in Wabash County*: A. B. Ulrey.

53. *Birds of Wabash County*: A. B. Ulrey and W. O. Wallace.

54. *Birds Observed in the Sawtooth Mountains*: B. W. Evermann and J. T. Scovell.

55. *Animal Parasites Collected in the State during the year 1894*: A. W. Bitting.

56. *Angling in the St. Lawrence and Lake Ontario*: Barton W. Evermann.

57. *Indiana Mammals*: Amos W. Butler.

58. *Mimicry in Fishes*: W. J. Moenkhaus.

59. *Variation in Leuciscus*: C. H. Eigenmann.

60. *The Redfish of the Idaho Lakes*: B. W. Evermann and J. T. Scovell.

61. *Observations upon Some Oklahoma Plants*: E. W. Olive.

62. *Rediscovery of Hoy's White Fish or Moon-eye (Argyrosoma hoyi)*: Barton W. Evermann.

63. *Saxifragaceæ of Indiana*: Stanley Coulter.

64. *The Range of the Blue Ash*: W. P. Shannon.

65. *Plant Products of the U. S. Pharmacopœia (1890)*: John S. Wright.

66. *Noteworthy Indiana Phanerogams*: Stanley Coulter.

67. *Methods of Infiltrating and Staining in oto the Heads of Vernonia*: E. H. Heckcock.

68. *Embryology of the Ranunculaceæ*: D. M. Mottier.

69. *Certain Chemical Features in the Seeds of Plantago Virginiana and P. Patagonica*: Alida M. Cunningham.

70. *Root System of Pogonia*: M. B. Thomas.

71. *Salt-rising Bread*: Katherine E. Golden.

72. *An Increasing Pear Disease in Indiana*: L. M. Underwood.

73. *Notes on the Florideæ*: Geo. W. Martin.

BIOLOGICAL SUBJECTS.

38. *Water Cultures of Indigenous Plants*: D. T. MacDougal.

39. *Working Shelves for Botanical Laboratory*: Katherine E. Golden.

40. *New Apparatus for Vegetable Physiology*: J. C. Arthur.

41. *Collections of Plants made during the Year*: M. B. Thomas.

42. *The Flowering Plants of Wabash County*: A. B. Ulrey and J. N. Jenkins.

43. *Revision of the Phanerogamic Flora of the State*: Stanley Coulter.

44. *Report of Progress of the Botanical Division of the State Biological Survey*: L. M. Underwood.

45. *Value of Seed Characters in Determining Specific Rank in the Genus Plantago*: Alida M. Cunningham.

46. *Additions to the Fish Fauna of Wabash County*: W. O. Wallace.

47. *Notes on the Reptilian Fauna of Vigo*: W. S. Blatchley.

48. *Preliminary List of Birds of Brown County*: Edward M. Kindle.

49. *The Birds of 1893*: Amos W. Butler.

50. *Some Notes on the Blind Animals of Mainmoth Cave, with Exhibition of Specimens*: R. Ellsworth Call.

74. *Measurement of Strains Induced in Plant Curvatures*: D. T. MacDougal.

75. *The Stomates of Cyas*: Edgar W. Olive.

76. *The Buckeye Canoe of 1840*: W. P. Shannon.

77. *Embryo-Sac of Jeffersonia Diphylla*: Frank M. Andrews.

78. *Cell Structure of Cyanophyceæ*: Geo. W. Martin.

79. *Some Notes on the Amoeba*: A. J. Bigney.

80. *Variations of the Polyporus lucidus*: L. M. Underwood.

81. *Preliminary Account of the Development of Etheostoma Ceruleum*: A. B. Ulrey.

82. *Embryology of the Cupuliferæ*: D. W. Mottier.

83. *Embryology of the Frog*: A. J. Bigney.

84. *Variation in Etheostoma*: W. J. Moenkhauß.

85. *Blood Corpuscles of very Young Human Embryo*: D. W. Dennis.

86. *Poisonous Influences of some Species of Cypripedium*: D. T. MacDougal.

87. *Development of Sexual Organs of Cymatogaster*: C. H. Eigenmann.

88. *The Vegetation House as an Aid in Research*: J. C. Arthur.

89. *The Proposed New Systematic Botany of North America*: L. M. Underwood.

SCIENTIFIC JOURNALS.

ASTROPHYSICAL JOURNAL, FEB.

On a Lens for Adapting a Visually Corrected Refracting Telescope to Photographic Observations with the Spectroscope: JAMES E. KEELER.

Schmidt's Theory of the Sun: E. J. WILCZYSKI.

A Cloud-Like Spot on the Terminator of Mars: A. E. DOUGLASS.

Preliminary Table of Solar Spectrum Wave-Lengths. II.: H. A. ROWLAND.

Photographic Observations of Eclipses of Jupiter's Satellites: WILLARD P. GERRISH.

The Arc-Spectra of the Elements. II. Ger-

manium: H. A. ROWLAND and R. R. TATNALL.

Comparison of Photometric Magnitudes of the Stars: EDWARD C. PICKERING.

The Spectrum of δ Cephei: A. BELOPOLSKY.

Minor Contribution and Notes; Reviews; Recent Publications.

NEW BOOKS.

Butterflies and Moths: W. FURNEAUX. London and New York, Longmans, Green & Co. 1894. Pp. xiv+358. \$3.50

Elements of Astronomy: GEORGE W. PARKER. London and New York, Longmans, Green & Co. 1894. Pp. 236. \$1.75

Steam and the Marine Steam-Engine: JOHN LEO. London and New York, Macmillan & Co. 1894. Pp. xiv+196. \$2.50

Memoir of Sir Andrew Crombie Ramsay: SIR ARCHIBALD GEIKIE. London and New York, Macmillan & Co. 1895. Pp. x+397. \$4.00

Meteorology: THOMAS RUSSELL. London and New York, Macmillan & Co. 1895. Pp. xxiii+277. \$4.00

The Supremacy of the Spiritual: EDWARD RANDALL KNOWLES. Arena Publishing Co. 1895. Pp. 61.

The International Beginning of the Congo Free State: JESSIE SIDDALL REEVES. Baltimore, Johns Hopkins University Press. 1894. Pp. 106.

Report of work of the Agricultural Experiment Stations of the University of California; Being a Part of the Report of the Regents of the University: Sacramento, 1894. Pp. 506.

The Cause of Warm and Frigid Periods: C. A. M. TABER. Boston, Ellis. 1894. Pp. 80.

Electrical Engineering for Electric Light Artisans and Students: W. SLINGS and A. BROOKER. London and New York, Longmans, Green & Co. New and Revised Edition. 1895. 8°, pp. vii+758. 346 illustrations.